

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF SECRETARY

In the Matter of)

Amendment to the Commission's)

Rules Regarding a Plan for)

Sharing the Costs of)

Microwave Relocation)

WT Docket No. 95-157

RM-8643

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COMMENTS OF ALEXANDER UTILITY ENGINEERING INC.

Alexander Utility Engineering Inc. ("AUE") hereby submits its Comments in response to the Commission's Notice of Proposed Rulemaking ("Notice") in the above-referenced proceeding.¹

A consulting engineering firm established in 1970, AUE provides electrical, communications and graphics information services to a diverse clientele of both public and private service providers. In the context of the microwave relocation process, AUE has developed focused engineering services to assist incumbent microwave users in the following areas: 1) user needs analysis; 2) microwave relocation negotiation; and 3) engineering/project management for installation and cutover. As a firm representing entities involved in the relocation process, AUE has an interest in the instant proceeding.

AUE applauds the Commission's proposed mandatory cost sharing plan and its effort to further clarify the relocation guidelines. As a general matter, AUE believes that the proposed cost sharing

¹ In re Amendment to the Commission's Rules Regarding a Plan for Sharing the Costs of Microwave Relocation, Notice of Proposed Rulemaking (FCC 95-426), WT Dkt. No. 95-157, RM 8643 (released Oct. 13, 1995).

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plan will supply needed and appropriate incentives for PCS licensees to relocate microwave links in an efficient manner.

As shown below, AUE supports the proposed per link cap and believes that, as proposed, the cap should be expressly limited to the cost sharing formula (with no application to microwave incumbents). AUE generally supports the clarifications proposed in the Notice to the relocation guidelines. However, AUE disagrees that it is possible to ascertain "comparability" when analog facilities are to be replaced with digital facilities. Absent a thorough economic analysis, it is not possible to compare operating costs for analog versus digital systems. AUE also comments below on other aspects of the relocation guidelines.

The Notice tentatively concludes that a per link cap equalling \$250,000 (plus \$150,000 if a tower is required) on the amount subject to reimbursement under the cost sharing formula is appropriate. Notice at para. 43. AUE supports the proposed cap as an accurate approximation of the likely cost of relocating the majority of microwave links. Specifically, AUE concurs with the statement that path lengths in the 6 GHz band (where most relocation will occur) will be similar to path lengths in the 2 GHz band, enabling link replacement on a one-for-one basis except in those cases where a new repeater may be required. Id. at para. 43.

As envisioned by the Commission, the cap should be expressly limited to the cost-sharing formula. Id. at paras. 40-43. In other words, the cap should be limited to the amount which the initial PCS relocater can recover from subsequent PCS licensees

only. The Commission should make clear that microwave incumbents can receive premium payments beyond the cap, and that the cap has no application to microwave incumbents. The ultimate arrangement reached between a PCS licensee and the microwave incumbent should be the product of an independent negotiation and remain totally independent of the cap.

The Commission's Rules require PCS licensees to provide microwave incumbents with "comparable facilities" as a condition for involuntary relocation.² The Commission's Notice proposes to clarify the factors used to determine when a facility is "comparable": communications throughput, system reliability and operating cost. Notice at para. 73.

As an initial matter, AUE wishes to point out that, in its view, digital (as opposed to analog) technology will best provide microwave incumbents with the capabilities which will be required in the future. Thus, many microwave incumbents will (and should) look to replace existing analog facilities with digital facilities.

Recognizing that digital facilities will be employed in many instances as replacement facilities in the relocation process, AUE submits that digital and analog systems are fundamentally not comparable. The Commission, microwave incumbents and PCS licensees would be better served to recognize that the replacement of analog with digital facilities, in the vast majority of cases, constitutes

² See 47 C.F.R. § 94.59(b) (1994); see also Redevelopment of Spectrum to Encourage Innovation in the Use of New Telecommunications Technologies, ET Docket No. 92-9, Third Report and Order and Memorandum Opinion and Order, 8 FCC Rcd 6589 at para. 15 (1993).

an upgrade (as opposed to a replacement with comparable facilities). This realization would enable parties to more realistically approach the negotiation process.³

The Notice proposes to "assume that the operating cost of all microwave systems are the same provided that they contain the same number of links." Notice at para. 74. AUE believes that this assumption oversimplifies engineering realities.

The cost factors involved with analog versus digital systems encompass potentially significant differences which can result in overall cost differences. Moreover, cost factors are varied, suggesting that a complete cost analysis is the only way to obtain a true picture of the relevant cost differences. The engineering characteristics of digital technology are such that digital systems are substantially less maintenance intensive than analog systems. Thus, operational support and contract maintenance support costs are significantly less than for analog systems. On the other hand, analog systems entail lower equipment and installation costs.

Attachments A-C hereto present a 10 year Net Present Value ("NPV") analysis of the inherent differences between analog and digital systems as well as the diverse factors which must be considered when assessing each system. Attachment A reflects the NPV associated with replacing a typical analog 1.9 GHz system with an analog 6 GHz system; attachment B shows the NPV to replace the

³ AUE strongly concurs with the Commission's belief that the negotiation process is the most appropriate means for determining comparability of the existing and replacement facilities. Notice at para. 72.

same analog 1.9 GHz system with a digital 6 GHz system. The result is that the analog-analog replacement NPV is \$2,632,900, while the analog-digital replacement NPV is \$2,280,442. In short, the digital NPV is \$352,458 less. The study factors underlying the estimated costs contained in both examples are contained in Attachment C.

The Notice proposes to define "communications throughput" as the amount of information transferred within the system for a given amount of time. Notice at para. 74. For a digital system, this is measured in bits per second ("bps") and for analog systems throughput is measured by the number of voice and or data channels. Id.

AUE submits that ultimately it is not possible to compare total throughput between an analog and digital system. Specifically, the Commission provides no means of contrasting bps, on the one hand, and voice or data channels, on the other. Comparing bps with voice or data channels is like comparing "apples with oranges."

The Notice proposes to define "system reliability" as the amount of time information is accurately transmitted within the system.⁴ AUE believes that analog and digital systems can be compared in terms of documented propagation studies, antenna

⁴ According to the Commission, "[t]he reliability of a system is a function of equipment failures (e.g., transmitter, feed lines, antennas, receivers, battery back-up power, etc.), the availability of the frequency channel due to propagation characteristic (e.g., frequency, terrain, atmospheric conditions, radio-frequency noise, etc.), and equipment sensitivity. [footnote omitted]" Notice at para. 74.

selections, fade margins, and power system requirements. However, the age of a given system can affect system reliability.⁵ AUE, believes that the proposed definition of system reliability should encompass a "system age" component which factors in this consideration.

The Notice proposes to clarify that the obligation to provide comparable facilities under involuntary relocation requires a PCS licensee to pay the cost of relocating only the specific microwave links in the incumbent's system that must be moved to prevent harmful interference by the PCS licensee's system. Notice at para. 76.

AUE believes that it would be more efficient and cost-effective for parties to move all links in a system at once rather than relocating them piecemeal. In a major incumbent network, the replacement of only one or two analog hops (with digital facilities) is totally ineffective and fragments the network thereby causing another level of administrative burden for the incumbent.⁶ The Commission appears to recognize this in its Notice: "it may be more efficient and more cost-effective in many instances for the parties to move all of the links in a system at once rather than to relocate them piecemeal." Id. at para 76. AUE

⁵ For example, two systems engineered to the same specifications but differing in age will not necessarily have the same system reliability. The newer system will most likely have greater system reliability.

⁶ Digital systems can be remotely maintained and monitored by computer. Analog systems, on the other hand, cannot and require the time, cost and paper work of field visits.

supports this observation and suggests that the Commission consider incentives to encourage entire system replacement.

In addressing how to account for technological disparities between old and new microwave equipment, the Commission seeks comment on whether and how depreciation of equipment and facilities should be taken into account. Notice at para. 77. The Notice asks, for example, "if analog equipment is unavailable to replace an existing analog system, should the PCS licensee be permitted to compensate the microwave incumbent only for the depreciated value of the old equipment?" Id.

The depreciated value of existing equipment is a non-issue and should not be considered in the negotiation process. Most existing equipment will be removed for junk with no salvage value.


Finally, the Commission seeks comment on whether additional information about the value of an incumbent's current system and the anticipated cost of relocation would also help to facilitate negotiations. Id. at para. 78.

Based on its experience in the PCS relocation process, AUE believes that the Commission should take steps to encourage the microwave licensee and microwave incumbent to have an up-front initial meeting--the sooner, the better--to establish an agreement on what services will be funded versus those that will not. This should result in an initial agreement (as distinguished from the relocation agreement itself) detailing the engineering research and cost estimate preparation for various alternatives. Such a step will enable microwave incumbents (which do not have budgets to fund

a major network redesign) to be assured that their costs will be covered by PCS licensees. This initial agreement would also enable PCS licensees to better understand their ultimate costs.

WHEREFORE, AUE supports the mandatory cost-sharing plan and relocation guideline clarifications, subject to its comments above.

Respectfully submitted,



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Dated: November 30, 1995

ATTACHMENT A

Microwave Relocation Cost Estimate

Plan 1 - Analog 1.9 GHz to Analog 6 GHz

Item #	Cost Item	YR1	YR2	YR3	YR4	YR5	YR6	YR7	YR8	YR9	YR10	NPV
1.0	Equipment - 300 Channel System Replacement											
1.1	Radio Equipment	\$400,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$400,000
1.2	Channel Equipment	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
1.3	Antennas	\$104,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$104,000
2.0	Forecasted Growth	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
3.0	Spare Equipment	\$15,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$15,000
4.0	Training Costs	\$1,600	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,600
5.0	Operational Support	\$208,000	\$216,320	\$224,973	\$233,972	\$243,331	\$253,064	\$263,186	\$273,714	\$284,662	\$296,049	\$1,634,675
6.0	Annual Contract Maintenance Support	\$8,000	\$8,320	\$8,653	\$8,999	\$9,359	\$9,733	\$10,123	\$10,527	\$10,949	\$11,386	\$62,872
7.0	Travel Cost	\$5,000	\$5,200	\$5,408	\$5,624	\$5,849	\$6,083	\$6,327	\$6,580	\$6,843	\$7,117	\$39,295
8.0	Unexpired Service life	\$22,500	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$22,500
9.0	Digital Data SVC											
9.1	56KB	\$5,000	\$5,200	\$5,408	\$5,624	\$5,849	\$6,083	\$6,327	\$6,580	\$6,843	\$7,117	\$39,295
9.2	1.544MB T-1	\$0	\$22,000	\$23,760	\$25,661	\$27,714	\$29,931	\$32,325	\$34,911	\$37,704	\$40,720	\$169,753
10.0	Engineering & Installation	\$144,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$144,000
	TOTAL											\$2,632,990
	Inflation	4%										
	Cost of Money	8%										

ATTACHMENT B

Microwave Relocation Cost Estimate

Plan 2 - Analog 1.9 GHz to Digital 6 GHz

Item #	Cost Item	YR1	YR2	YR3	YR4	YR5	YR6	YR7	YR8	YR9	YR10	NPV
1.0	Equipment - 300 Channel System Replacement											
1.1	Radio Equipment	\$640,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$640,000
1.2	Channel Equipment	\$210,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$210,000
1.3	Antennas	\$160,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$160,000
2.0	Forecasted Growth	\$0	\$0	\$73,549	\$0	\$0	\$82,732	\$0	\$0	\$0	\$0	\$110,521
3.0	Spare Equipment	\$25,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$25,000
4.0	Training Costs	\$4,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$4,000
5.0	Operational Support	\$104,000	\$108,160	\$112,486	\$116,986	\$121,665	\$126,532	\$131,593	\$136,857	\$142,331	\$148,024	\$817,337
6.0	Annual Contract Maintenance Support	\$4,000	\$4,160	\$4,326	\$4,499	\$4,679	\$4,867	\$5,061	\$5,264	\$5,474	\$5,693	\$31,436
7.0	Travel Cost	\$2,500	\$2,600	\$2,704	\$2,812	\$2,925	\$3,042	\$3,163	\$3,290	\$3,421	\$3,558	\$19,648
8.0	Unexpired Service life	\$22,500	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$22,500
9.0	Digital Data SVC											
9.1	56KB	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9.2	1.544MB T-1	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
10.0	Engineering & Installation	\$240,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$240,000
	TOTAL											\$2,280,442
	Inflation	4%										
	Cost of Money	8%										

ATTACHMENT C

MICROWAVE RELOCATION STUDY

Synopsis: Incumbent user has a 1.9 GHz four hop 300 channel analog microwave system with 8 terminals connecting 3 offices. Study is made to compare replacing the system with a 6 GHz analog system or a 6 GHz digital system.

Study factors to consider are:

- 1.0 Existing 300 channel system has 150 working channels.
- 2.0 Forecasted growth is for 10 additional channels per year.
- 3.0 Client has two leased-line 56kB circuits for AS400 Computer System connectivity to remote offices.
- 4.0 Client has plans for two leased-line 1.544mb T-1 circuits for LAN/WAN connections and video conferencing equipment to be added in year 2 of the study.
- 5.0 300 Channel Analog Radio System with DC Power System = \$50,000 each.
- 6.0 Each remote office has an initial Digital System Requirement of 5 T-1's.
- 7.0 Growth for the Digital System requires 2 additional T-1's at each remote office over the 10 year study life.
- 8.0 8 T-1 Digital Radio System e/w 5 T-1's with DC Power System = \$75,000 each.
- 9.0 28 T-1 Digital Radio System e/w 10 T-1's with DC Power System = \$85,000 each.
- 10.0 Initial Digital Channel Bank Equipment = \$50,000 each remote office.
- 11.0 Analog Radio Antennas = \$13,000 each.
- 12.0 Digital Radio Antennas = \$20,000 each.
- 13.0 Digital Growth in year 3 & 6 will add \$17,000 for each remote office in each period.
- 14.0 Spare Equipment for Analog Radio System = \$15,000.
- 15.0 Spare Equipment for Digital Radio System = \$25,000.
- 16.0 Employee loaded labor costs = \$50 per hour.
- 17.0 Employee Training for Analog System = 16 hours for 2 employees @\$50 per hour = \$1,600.
- 18.0 Employee Training for Digital System = 40 hours for 2 employees @\$50 per hour = \$4,000.
- 19.0 Operational Support for Analog System will remain at two employees to do end to end testing = \$208,000 annually.
- 20.0 Operational Support for Digital System can be reduced to one employee due to network management and remote testing = \$104,000 annually.
- 21.0 Annual Contract Maintenance for Analog System to test and set RF levels and test batteries = \$8,000.
- 22.0 Annual Contract Maintenance for Digital System to test batteries = \$4,000.
- 23.0 Annual Travel Expenses for Analog System with two employees = \$5,000.
- 24.0 Annual Travel Expenses for Digital System with one employee = \$2,500.

- 25.0 Incumbent has one existing system that has unexpired service life remaining of 3 years based on a 10 year straight line depreciation schedule. Original system cost = \$75,000. Unexpired Service Life = \$22,500 to be charged as expense to microwave relocation project.
- 26.0 56kB Leased-Line Digital Service will continue to be leased under the Analog replacement option at an annual rate of \$5,000. Digital option provides this service without leased-line fees.
- 27.0 1.544mB Leased-Line Digital Service will be added in year 2 of the study for the Analog replacement option at an annual rate of \$22,000. Digital option provides this service without leased-line fees.
- 28.0 Engineering and Installation for each Analog System = \$18,000
- 29.0 Engineering and Installation for each Digital System = \$30,000
- 30.0 Inflation = 4% Annual
- 31.0 Cost of Money = 8% Annual

ALEXANDER UTILITY ENGINEERING INC.
November 28, 1995